Living with Fire – The Forest Needs Fire?

Curriculum Standards
4-1.2   Use appropriate instruments and tools when conducting simple investigations
4-1.4   Distinguish among observations, predictions and inferences
4-1.6   Construct and interpret diagrams, tables, and graphs made from recorded measurements and observations
4-1.7   Use appropriate safety procedures

4-2.2   Explain how the characteristics of distinct environments influence the organisms present

4-4.3   Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns
4-4.5   Carry out the procedures for data collecting and measuring weather conditions by using appropriate tools and instruments
4-4.6   Predict weather from data collected through observation and measurements

Objectives: Students will learn about a forest ecosystem and one tool used to manage it, prescribed fire. Students will learn about tools used in prescribed burning including a prescribed burn plan and weather. Students will collect weather data and compare to desired weather conditions in a prescribed burn plan. *Time:* 45-60 minutes total

10-15 minutes -- introduce longleaf pine forest ecology and management, including the use or prescribed fire, prescriptions and maps.

30 minutes -- tools used to plan and execute prescribed fire: Nomex clothing, drip torch, rakes and other implements, engines and other water sources, WEATHER!! Weather is a tool? Demonstrate the use of fire weather belt kit instruments having the instructor demonstrate how each tool is used and then having the students break into teams and use the instrument. Repeat for each tool in the weather belt kit.

10 minutes – report data collected and determine if current conditions are within the prescribed guidelines of the written plan. Complete Journal response and reflection questions.

Teacher Information

The activity will take place at the Lake Bee Recreation Area of the Carolina Sandhills National Wildlife Refuge located on Highway 145 between the towns of McBee and Chesterfield in Chesterfield County. All roads leading to this area are paved and bus parking is available at the site. The site includes covered picnic shelters, picnic tables, rest-room facilities, and trash receptacles. A minimum of two refuge staff (or trained volunteers) will lead the planned activities. All materials and tools, if applicable, will be provided. Teachers will need to copy and distribute journal pages to students prior to the field trip.

Background: An ecosystem is a place where living and nonliving elements interact. Examples of living elements would be plants and animals. Nonliving elements affecting these living plants and animals would be sunlight, moisture, temperature, and wind. In different parts of the world, these nonliving elements have a greater or lesser impact on the living elements.

Here at Carolina Sandhills National Wildlife Refuge, the warm, moderate climate stimulates plant growth almost year round. Another nonliving element that greatly affects the structure and composition of refuge ecosystems is fire. The predominant tree species on the refuge is longleaf pine, a southern yellow pine with thick, fire-tolerant bark. Scientists know that longleaf pine is adapted to fire by studying its growth and development. First, for a seed to germinate, it must be exposed to bare mineral soil. Fire will remove debris, leaves, and other litter on the forest floor to expose mineral soil. Once the seeds germinate, the small seedling, called a candle, remains in a grass-like stage for 3 to 5 years. Again, if fire burns across the landscape, the needles will burn but re-sprout as the terminal bud is insulated from the fire. To develop fully, the tree must be free from competition. Young pines require a lot of sunlight and nutrients and do not thrive when shaded by other developing tree and shrub species. For the forest to mature, frequent fire reduces other species that are not fire-tolerant so that the pines may grow. As the tree develops, a slick, heat resistant bark develops, insulating the tree.

Historically, lightning started many fires across the southeastern landscape. In addition, Native Americans burned the woods to clear out debris and create park-like conditions where they could easily hunt game animals. Later, early settlers continued the use of fire to aid in hunting and to create open areas where they could farm. In the early 1900s, people who did not understand the important role of fire both ecologically and socially encouraged the suppression of all fires. The southeastern landscape changed dramatically. Gone were the open, park-like forests where game animals proliferated. The woods became choked with scrubby oaks and fewer grasses and forbs (succulent green plants high in nutrients). Several wildlife species began to decline or were eliminated from the ecosystem: the red-cockaded woodpecker (endangered), the Carolina parakeet (extinct), and Bachman's warbler (extinct).

Recognizing the important role of fire in the longleaf pine ecosystem, the refuge uses controlled burns to mimic what naturally and historically occurred on the landscape for thousands of years. In restoring the open, park-like conditions, several animal populations that are declining elsewhere are thriving on the refuge: the red-cockaded woodpecker, southern fox squirrel, bobwhite quail, and Bachman's sparrow.

Students will measure wind speed, wind direction, air temperature, ground temperature, and relative humidity to see how refuge staff use weather to plan and execute a safe controlled burn.

Career Connections:

Students will interact with wildlife biologists and foresters and will learn what people in these careers do at their jobs. Leaders will discuss core subjects and educational requirements and recommend opportunities for further study and experience in the field.

Resources:

Refuge website -- http://www.fws.gov/carolinasandhills/

4th grade Curriculum Standards -- http://www.sceoc.com/06-07%20Standards/Grade%2005.pdf

Classroom enrichment – Living with Fire

1. A scientist who studies and predicts weather is:

a. forester   b. biologist   c. meteorologist   d. fire fighter

2. The controlled use of fire designed to meet specific management objectives such as reducing the number of oak trees is:

e. forestry   f. meteorology   g. wildlife management   h. prescribed burning

3.   The longleaf pine forest is a type of _____ adapted to frequent fires.

a. ecology   b. field   c. ecosystem   d. succession

4. Fire in the longleaf pine forests reduces _____ with other plants so that young pines can get the sunlight and nutrients they need to grow.

e. competition   f. habitat   g. heat   h. temperature

5. A plan that lists conditions under which a controlled burn can be safely done is called a:

a. compass   b. thermometer   c. anemometer   d. prescription

6. We measured the _____ at ground level and three feet above ground with a thermometer.

e. temperature   f. wind direction   g. wind speed   h. humidity

7. We determined the wind direction using the _____ and the wind speed using the _____.

a. thermometer, compass   b. anemometer, thermometer   c. compass, anemometer

d. none of the above

8. Finding the amount of moisture in the air, or the _____, was the most complicated task.

e. temperature   f. humidity   g. heat   h. wind speed

9. We used a _____ , something like a ruler that slides, to measure the moisture content of the air.

a. sling Psychrometer   b. anemometer   c. thermometer   d. compass

10. The relationship between organisms and their environment is:

e. wildlife management   f. humidity   g. habitat   h. ecology

Bonus: An area in which a specific plant or animal naturally lives, grows and reproduces; the area that provides a plant or animal with adequate food, water, shelter, and living space is:

a. ecosystem   b. habitat   c. forest   d. succession